What Is Claimed Is:

1. A time-scale modification method for a digital audio signal, in which an audio sample stream of an input signal is segmented into a plurality of overlapping analysis windows, the length of the overlapping area is changed into a length corresponding to an assigned time-scale α, and the overlapping area is weighted-synthesized to thereby be converted into a time-scaled output signal, the method comprising steps of:

a) defining N+Kmax number of samples starting from the mSa^{th} sample (m: period index) of an input audio sample as an analysis window W_m of current period m, wherein, if a value of a desired synthesis interval Ss divided by the time-scale α is a natural number, the value is assigned as an analysis interval Sa, and if it is a decimal, two natural numbers nearest to the decimal are assigned respectively as a modified analysis interval Sa' and a compensated analysis interval Sa", the modified analysis interval Sa' and the compensated analysis interval Sa" being alternately applied in place of the analysis interval Sa every time when a certain desired condition is met;

b) calculating a shift value K_m of the current period analysis window W_m when exhibiting a highest waveform-similarity between OV number of samples from the end of the output audio sample and OV number of samples of the current period analysis window W_m overlapping therewith, while shifting the starting point of the current period analysis window W_m by a certain predefined number of samples in a search range defined as Kmax number of samples from the $OV+1^{th}$ sample counting from the end of an output signal of previous period m-1;

c) defining N number of samples starting from the $Km+1^{th}$ sample from the

front of the current period analysis window W_m as an additional frame to be added to the current period, wherein an output signal of the current period m is synthesized by overlap-adding OV number of samples from the front of the additional frame to OV number of samples from the end of the previous period frame; and

d) accumulating an error between a real reproduction time of the output signal of the current period m and a computed reproduction time calculated by the time-scale α, wherein, when the accumulated error is deviated from the upper or lower limit of an allowed error range, the certain desired condition is considered as being met.

2. A time-scale modification method according to claim 1, further comprising a step of: when the time-scale α is changed, recalculating an analysis interval Sa based on the changed time-scale, wherein a time-scale modification is processed using the changed time-scale and the recalculated analysis interval Sa.

3. A time-scale modification method according to claims 1 or 2, wherein the time-scale α includes a time-scale assigned by a user input device, or a real time-scale of a video signal provided through a time-scale process of a video signal, which is carried out along with a time-scale modification of a video signal.

4. A time-scale modification method according to claim 1, wherein plural samples are skipped when shifting the analysis window Wm within the search range Kmax at every period.

5. A time-scale modification method according to any one of claims 1 to 4,

wherein the waveform-similarity is determined by a cross-correlation between the overlapping area consisting of a certain number of samples from the end of the previous period frame and the certain number of samples of the current period analysis window W_m of the current period, which is overlapping with the previous period frame.

6. A time-scale modification method according to claim 5, wherein, among the samples of the previous period frame and the current period analysis window, a sample whose index is multiple of k (k: a natural number larger than 2) is selected and participated in the computation of the cross-correlation.

7. A time-scale modification method for a digital audio/video signal, in which an input digital audio/video signal is separated into an audio signal and a video signal, each of which is time-scaled with a same time-scale α, the method comprising steps of:

a) calculating periodically a real time-scale of a time-scaled video signal obtained by time-scaling the video signal based on the time-scale α;

b) determining whether a real time-scale of a current period of the time-scaled video signal differs from that of a previous period, wherein, if different, the real time-scale of the current period is provided as a target time-scale α', the target time-scale α' becoming a reference for the time-scale modification of the audio signal; and

c) segmenting a sample stream of the input audio signal into a plurality of overlapping analysis windows, changing the length of the overlapping area into a length corresponding to the target time-scale α', and weighted-synthesizing the overlapping area, thereby modifying into a time-scaled output audio signal.

8. A time-scale modification method according to claim 7, wherein the step c) comprises steps of:

a) defining N+Kmax number of samples starting from the mSa^{th} sample (m: period index) of the input audio signal as an analysis window W_m of current period m, wherein, if a value of a desired synthesis interval Ss divided by the target time-scale α' is a natural number, the value is assigned as an analysis interval Sa, and if it is a decimal, two natural numbers nearest to the decimal are assigned respectively as a modified analysis interval Sa' and a compensated analysis interval Sa", the modified analysis interval Sa' and the compensated analysis interval Sa" being alternately applied in place of the analysis interval Sa every time when a certain desired condition is met;

b) calculating a shift value K_m of the current period analysis window W_m when exhibiting a highest waveform-similarity between OV number of samples from the end of the output audio sample and OV number of samples of the current period analysis window W_m overlapping therewith, while shifting the starting point of the current period analysis window W_m by a certain predefined number of samples in a search range defined as Kmax number of samples from the $OV+1^{th}$ sample counting from the end of an output signal of previous period m-1;

c) defining N number of samples starting from the $Km+1^{th}$ sample from the front of the current period analysis window W_m as an additional frame to be added to the current period, wherein an output signal of the current period m is synthesized by overlap-adding OV number of samples from the front of the additional frame to OV number of samples from the end of the previous period frame; and

d) accumulating an error between a real reproduction time of the output signal of the current period m and a computed reproduction time calculated by the time-scale

α', wherein, when the accumulated error is deviated from the upper or lower limit of an allowed error range, the certain desired condition is considered as being met.

9. A time-scale modification method according to claim 1, 7, or 8, wherein the real time-scale of the video signal is a ratio between an elapsed time T2-T1 from a certain point T1 in the past to a current time T2 and an elapsed time TS2-TS1 from a time stamp TS1 of a time-scaled video frame in the certain point T1 in the past to a current time stamp TS2 of a time-scaled video frame in the current time T2.

10. A time-scale modification method according to claim 7 or 8, wherein the upper and lower limit of the allowed error range is determined within an error range such that an unsynchronization between the audio and video signals is not recognized during their time-scaled reproduction.

11. A time-scale modification method according to claim 8, wherein plural samples are skipped when shifting the analysis window Wm within the search range Kmax at every period.

12. A time-scale modification method according to claim 8, wherein the waveform-similarity is determined by a cross-correlation between the overlapping area consisting of a certain number of samples from the end of a previous period frame and the certain number of samples of the current period analysis window W_m, which is overlapping with the previous period frame.

13. A time-scale modification method according to claim 12, wherein, among all the samples of each of the previous period frame and the current period analysis window, a sample whose index is of k (k: a natural number larger than 2) is selected and participated in the computation of the cross-correlation.

14. A method of reproducing a broadcast signal using an apparatus, which receives a transport stream of a digital television broadcast signal compressed and coded in a MPEG mode and reproduces video and audio signals in real-time, the method comprising steps of:

a) storing sequentially a digital television broadcast signal being received in a storage means at least after a user inputs a phone-break key;

b) after the user presses a return key, reading the stored broadcast signal in a FIFO mode and time-scaling the respective retrieved video and audio signals with a predetermine time-scale, wherein, in particular, the time-scaling of the audio signal is performed based on a real time-scale α of the produced video signal, the real time-scale of the video signal obtained by the time-scaling of the video signal being calculated by applying the predetermine time-scale, an audio sample stream of an input signal is segmented into a plurality of overlapping analysis windows, the length of the overlapping area is changed into a length corresponding to the real time-scale α of the video signal, and the overlapping area is weighted-synthesized, thereby converting into a time-scaled output signal; and

c) outputting the time-scaled video and audio signals in place of a broadcast signal being currently received.

15. A method according to claim 14, further comprising a step of outputting a broadcast signal being currently received instead of the stored broadcast signal, if a time difference between a broadcast signal reproduced by applying the time-scale α as a value for a high speed reproduction mode and the broadcast signal being currently received falls within a certain desired error range.

16. A method according to claim 14, further comprising a step of, when the phone-break period between the phone-break key input and the return key input exceeds the maximum storage time of the storage means, replacing with the broadcast signal being currently received the stored broadcast signal, in sequence from an earlier stored one, and changing the start address of the phone-break period from the current time into an address of a broadcast signal stored before the maximum storing time.

17. A method of reproducing a broadcast signal using an apparatus, which receives a transport stream of a digital television broadcast signal compressed and coded in a MPEG mode and reproduces video and audio signals in real-time, the method comprising steps of:

a) storing sequentially the broadcast signal in a storage means;

b) when a user's back-and-slow key input is detected, reading the stored broadcast signal in a FIFO mode, starting from a broadcast signal received before a certain period of time from that time point, and time-scaling the respective retrieved video and audio signals with a predetermine time-scale so as to enable a low speed reproduction, wherein, in particular, the time-scaling of the audio signal is performed based on a real time-scale α of the produced video signal, the real time-scale of the

video signal obtained by the time-scaling of the video signal being calculated by applying the predetermine time-scale, an audio sample stream of an input signal is segmented into a plurality of overlapping analysis windows, the length of the overlapping area is changed into a length corresponding to the real time-scale α of the video signal, and the overlapping area is weighted-synthesized, thereby converting into a time-scaled output signal; and

c) outputting the time-scaled video and audio signals in place of a broadcast signal being currently received.

18. A method according to claim 17, further comprising steps of: a) when the user inputs a return key, time-scaling the stored broadcast signal for a high speed reproduction by modifying the time-scale into a value for a high speed reproduction mode, and b) outputting a broadcast signal being currently received instead of the stored broadcast signal, if a time difference between a broadcast signal being reproduced in a high speed mode and the broadcast signal being currently received falls within a certain desired error range.

19. A method of reproducing a broadcast signal using an apparatus, which receives a transport stream of a digital television broadcast signal compressed and coded in a MPEG mode and reproduces video and audio signals in real-time, the method comprising steps of:

a) storing sequentially the broadcast signal in a storage means at least after a user inputs an immediate-slow key;

b) reading the stored broadcast signal in a FIFO mode starting from the point of

inputting the immediate-slow key and time-scaling the respective retrieved video and audio signals with a predetermine time-scale so as to enable a low speed reproduction, wherein, in particular, the time-scaling of the audio signal is performed based on a real time-scale α of the produced video signal, the real time-scale of the video signal obtained by the time-scaling of the video signal being calculated by applying the predetermine time-scale, an audio sample stream of an input signal is segmented into a plurality of overlapping analysis windows, the length of the overlapping area is changed into a length corresponding to the real time-scale α of the video signal, and the overlapping area is weighted-synthesized, thereby converting into a time-scaled output signal; and

c) outputting the time-scaled video and audio signals in place of a broadcast signal being currently received.

20. A method according to claim 19, further comprising steps of: a) when the user inputs a return key, time-scaling the stored broadcast signal for a high speed reproduction by modifying the time-scale into a value for a high speed reproduction mode, and b) outputting a broadcast signal being currently received instead of the stored broadcast signal, if a time difference between a broadcast signal being reproduced in a high speed mode and the broadcast signal being currently received falls within a certain desired error range.

21. A method according to claim 14, 17, or 19, wherein the time-scaling of the audio signal is carried out by steps of:

a) defining N+Kmax number of samples starting from the mSa^{th} sample (m:

period index) of the input audio signal as an analysis window W_m of current period m, wherein, if a value of a desired synthesis interval Ss divided by the time-scale α is a natural number, the value is assigned as an analysis interval Sa, and if it is a decimal, two natural numbers nearest to the decimal are assigned respectively as a modified analysis interval Sa' and a compensated analysis interval Sa", the modified analysis interval Sa' and the compensated analysis interval Sa" being alternately applied in place of the analysis interval Sa every time when a certain desired condition is met;

b) calculating a shift value K_m of the current period analysis window W_m when exhibiting a highest waveform-similarity between OV number of samples from the end of the output audio sample and OV number of samples of the current period analysis window W_m overlapping therewith, while shifting the starting point of the current period analysis window W_m by a certain predefined number of samples in a search range defined as Kmax number of samples from the $OV+1^{th}$ sample counting from the end of an output signal of previous period m-1;

c) defining N number of samples starting from the $Km+1^{th}$ sample from the front of the current period analysis window W_m as an additional frame to be added to the current period, wherein an output signal of the current period m is synthesized by overlap-adding OV number of samples from the front of the additional frame to OV number of samples from the end of the previous period frame; and

d) accumulating an error between a real reproduction time of the output signal of the current period m and a computed reproduction time calculated by the time-scale α, wherein, when the accumulated error is deviated from the upper or lower limit of an allowed error range, the certain desired condition is considered as being met.

22. A method according to claim 14, 17, or 19, wherein further comprising a step of uncompressing and decoding the video and audio signals respectively by means of a MPEG decoder before time-scaling the broadcast signal stored in the storage means.

23. A method according to claim 14, 17, or 19, wherein the time-scaling of the video signal is performed by an adjustment of the output time interval of the video frames so as to be as fast as the time-scale, or a reduction of the number of output frames so as to be as low as the time-scale, or a combination of the above two.

24. A method according to claim 14, 17, or 19, wherein the adjustment of the output time interval of the video frames is carried out an adjustment of the value of presentation time stamp of the video frame.